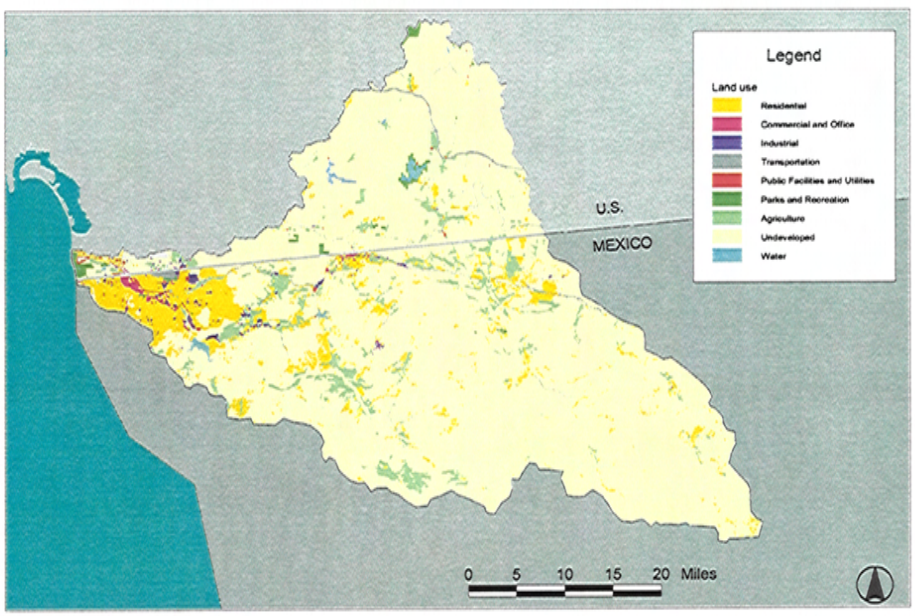
the land classified as undeveloped is used for low intensity cattle and goat grazing.

Different land uses and hydrology can influence water quality conditions within the watershed. Soil erodibility can also influence water quality and streambed conditions. Urban land use categories have been found to generally result in high loads of COCs that cause water quality degradation. Contaminants in urban runoff have been linked directly to the amount of impervious cover and the land use type. Generally, open space areas and undeveloped land have lower contaminant loads into watersheds while residential, commercial, industrial and transportation land uses have higher contaminant loads. Contaminants associated with residential, commercial, industrial, and transportation land uses include oil and grease, bacteria, pesticides, metals, suspended solids, and surfactants, while open space and construction activities tend to contribute to sedimentation. Agricultural land uses tend to contribute nutrients and pesticides to watershed loads.

Figure 4-2: Tijuana River Watershed Land Use Map.



Land use data source: CESAR, San Diego State University

Observations Based on Benthic Bioassessment Data

Bioassessment monitoring of the Tijuana River watershed has been limited to the upper reaches that are characterized by minimal urban impacts. Most of these upper monitoring reaches scored above average for the San Diego region. Neither MEC nor CDFG has sampled the lower reach of the river where it re-enters the United States below the City of Tijuana, Mexico. Future sampling in lower reaches is currently being considered by the Copermittees in order to determine the level of impacts to the benthic community in urban areas.

Observations Based on Mass Loading Station Monitoring

The Tijuana River watershed was monitored by the San Diego Municipal Storm Water Copermittees for the first time in 2001-2002 as part of the Core Monitoring Program. The data represent only one season or three storm events monitored at the mass loading station on Tijuana River on 29 January, 17 February and 17 March 2002.

The Tijuana Watershed mass loading station is located under the Hollister Street Bridge in San Diego, downstream from the International Boundary and Water Commission's (IBWC) diversion structure and treatment plant. During periods of low flow the river is diverted through the treatment plant. The river flows freely once the water level rises over the diversion structure. The Tijuana River at the sampling site is an unimproved channel. The river flows through Tijuana, Mexico and runoff contributions come from both Mexico and the United States. However, due to the presence of dams and reservoirs in the watershed (Presa Rodriguez in Mexico and Barrett Lake in the U.S.), the source of contributing runoff is limited to the central subwatersheds.

4.b. Tijuana River Watershed Constituents of Concern

Data from three 2001-2002 storm events monitored at the mass loading station on Tijuana River were reviewed to determine the list of potential constituents of concern. To characterize a pollutant as a COC, the MLS data was compared to an associated reference value. Reference values include, but are not limited to, water quality objectives in the San Diego Basin Plan, similar water quality standards, and stormwater discharge quality objectives. It should be noted that the standards identified in the USEPA Multi-Sector General Permit are discharge-quality objectives rather than in-stream water quality standards. These reference values are included for comparison and do not necessarily constitute a violation. Please refer to Table 4-1 below for the constituents of concern that were tracked in the Tijuana River.

Table 4-1: Constituents of concern measured in the Tijuana River.

ANALYTE	UNITS	Reference Value	Source	Tijuana River		
				01/29/02	02/17/02	03/17/02
General / Physical / Organic						
Electrical Conductivity	Umhos/cm			1610	2300	2490
Oil And Grease	mg/L	15	USEPA Multi-Sector General Permit (a)	4	2	1
pH	pH Units	6.5-8.5	Basin Plan	7.4	8.1	7.6
Bacteriological						
Enterococci	MPN/100 mL			170,000	500,000	17,000
Fecal Coliform	MPN/100 mL	4000	Basin Plan	***800,000***	***300,000***	***300,000***
Total Coliform	MPN/100 mL			1,700,000	800,000	1,100,000
Wet Chemistry						
Ammonia As N	mg/L	0.025 (b)	Basin Plan	***8***	***7.2***	***6.4***
BOD	mg/L	30	USEPA Multi-Sector General Permit (a)	27.3	***46.2***	***33.3***
Chemical Oxygen Demand	mg/L	120	USEPA Multi-Sector General Permit (a)	95	***263***	***122***
Dissolved Phosphorus	mg/L	2	USEPA Multi-Sector General Permit (a)	***2.2***	***2.9***	***2.28***
Nitrate As N	mg/L	10	Basin Plan (c)	1.6	0.8	1.1
Nitrite As N	mg/L	1	Basin Plan (c)	0.34	***1.44***	0.6
Surfactants (Mbas)	mg/L	0.5	Basin Plan	<0.5	***3.3***	***0.7***
Total Dissolved Solids	mg/L	500-2100	Basin Plan by watershed	737	1080	965
Total Kjeldahl Nitrogen	mg/L			10.3	12	16.8
Total Phosphorus	mg/L	2	USEPA Multi-Sector General Permit (a)	***3.2***	***4.7***	***2.52***
Total Suspended Solids	mg/L	100	USEPA Multi-Sector General Permit (a)	***240***	48	***176***
Turbidity	NTU	20	Basin Plan	***48.4***	19.9	***54.7***
Pesticides						
Chlorpyrifos	µg/L	0.02	CA Dept. of Fish & Game	***0.06***	***0.08***	***0.09***
Diazinon	µg/L	0.08	CA Dept. of Fish & Game	***0.74***	***0.53***	***0.57***
Hardness						
Total Hardness	mg $CaCO_3$/L			970	352	286
Total Metals						
Antimony	mg/L	0.006	Basin Plan	0.003	0.003	0.003
Arsenic	mg/L	0.34/0.05	40 CFR 131/ Basin Plan	0.007	0.008	0.006
Cadmium	mg/L	0.0046	40 CFR 131	<0.001	<0.001	<0.001
Chromium	mg/L	0.016	CTR (Cr VI)	***0.02***	0.013	0.006
Copper	mg/L	0.0135	40 CFR 131	***0.028***	0.013	***0.016***
Lead	mg/L	0.082	40 CFR 131	0.025	0.005	0.009
Nickel	mg/L	0.47/0.1	40 CFR 131/ Basin Plan	0.044	0.033	0.028
Selenium	mg/L	0.02	40 CFR 131	<0.002	0.008	<0.002
Zinc	mg/L	0.122	40 CFR 131	0.12	0.041	0.062
Dissolved Metals						
Antimony	mg/L	(g)	40 CFR 131	<0.002	<0.002	0.002
Arsenic	mg/L	0.34 (e)	40 CFR 131	0.005	0.004	0.005
Cadmium	mg/L	(d)	40 CFR 131	<0.001	<0.001	<0.001
Chromium	mg/L	(d)	40 CFR 131	<0.005	<0.005	<0.005
Copper	mg/L	(d)	40 CFR 131	0.008	<0.005	<0.005
Lead	mg/L	(d)	40 CFR 131	<0.002	0.002	<0.002
Nickel	mg/L	(d)	40 CFR 131	0.033	0.028	0.024
Selenium	mg/L	0.2 (f)	40 CFR 131	<0.002	<0.002	<0.002
Zinc	mg/L	(d)	40 CFR 131	<0.02	0.026	0.057
Toxicity						
Ceriodaphnia 96-hr	LC_{50} (%)	100		***36.11***	***17.36***	***32.99***
Ceriodaphnia 7-day survival/reproduction	NOEC (%)	100		***12.5/6.25***	***12.5/12.5***	***12.5/6.25***
Hyalella 96-hr	NOEC (%)	100		100	100	100
Selenastrum 96-hr	NOEC (%)	100		100	100	100

(a) The standards identified in the USEPA Multi-Sector General Permit are discharge-quality objectives rather than in-stream water quality standards. These reference values are included for comparison and do not necessarily constitute a violation.

(b) Water Quality Objective is for unionized ammonia, insufficient information is available to calculate unionized ammonia.

(c) The underlying water quality objective in the Basin Plan is "Inland surface waters...shall not contain biostimulatory substances in concentrations that promote aquatic growth to the extent that such growths cause nuisance or adversely affect beneficial uses." The Basin Plan also states a goal of 0.1 mg/L for total phosphorous to support this objective. The reference value for nitrogen/nitrates in this table entry is derived from this phosphorous goal, using a ratio suggested by RWQCB staff. This reference value is not a Basin Plan water quality objective.

(d) Water Quality Objective for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(e) Water Quality Objectives for dissolved metal fractions are based on water effects ratios (WER) and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(f) Water Quality Objective is based on the total recoverable form as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(g) USEPA has not published an aquatic life criterion value

Highlighted Text - exceeds water quality reference value

Sources

USEPA National Pollutant Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities, 65 Federal Register (FR) 64746, Final Reissuance, October 30, 2000.

California Department of Fish and Game. Office of Spill Prevention and Emergency Response, Hazard Assessment and Water Quality Criteria documents for pesticides (various dates).

San Diego Regional Water Quality Control Board Basin Plan Water Quality Objectives.

USEPA Federal Register Document 40 CFR Part 131, May 18, 2000.

Several constituents of concern and/or stressors exceeded Basin Plan or other reference values during 2001-02 including bacterial indicators, ammonia, BOD, COD, turbidity, total phosphorus, dissolved phosphorus, total suspended solids, total copper, diazinon and chlorpyrifos.

At the Tijuana River mass loading station, toxicity to *Ceriodaphnia dubia* (96 hour survival, 7-day survival, and 7-day reproduction) was measured during all three storm events.

4.c. Triad Decision Matrix

The bioassessment data, chemical analysis and toxicity testing are combined in the triad decision matrix. That is, these data are collectively evaluated to determine whether the evidence suggests the need for additional monitoring efforts, such as development and implementation of a Toxicity Identification Evaluation (TIE) to identify the constituents causing toxicity. Please refer to Table 4-2 below.